by ingenuity in devising efficient apparatus and illustrates the potency of logical inquiry. One unfavorable criticism is that the scientific name of the organism is not given. During a study of a pest of the cotton crop in Egypt, the author noted that cultures of this "sore-shin" fungus showed a notable difference between the thermal death-point and the temperature inhibiting growth. This observation suggested an analysis of the temperature factor in its effects upon growth. It is stated that the hyphae of this fungus are morphologically and physiologically equivalent, in that spore-formation, sexual or asexual, does not occur. Of course this statement is not to be taken literally, as it would be very difficult to say that all the hyphae of a given fungus are physiologically equivalent. As a matter of fact, the author himself states that in liquid cultures at 20° C. resting cells are formed in abundance. If the cultures are grown at 34° C. growth ceases (culture becomes stale) much earlier than at lower temperatures. This feature of "staleness" or of discontinued growth was found to be caused by the accumulation of substances which retard and if sufficiently concentrated stop growth. The substance or substances which originate in the organism as a result of the effect of temperature, and whose influence is to inhibit growth, have been isolated from the organism as products of katabolism, though they have not been chemically identified. To such katabolites the provisional name of "X" is given. From a large number of tests whose results are tabulated, illustrated by appropriate curves and verbally discussed, it appears to be demonstrated (*a*) that with increasing temperature there is a regular acceleration in the rate of growth up to 30° C. and this acceleration approximately fulfils the expectation based upon VAN'T HOFF'S law; (*b*) above 30° C. the growth-rate acceleration decreases as the factor of time becomes limiting; (*c*) later growth stops at a fairly definite temperature, which the author proposes to call the "stopping point;" (*d*) the optimum is therefore not a definite temperature but a status of the organism in which the effects of the factors of time and of temperature physiologically balance. As would be expected the style and composition of the paper are consistent with the logical development of the investigation.—RAYMOND H. POND.

Seedlings of conifers.—With the hope of finding facts of phylogenetic importance, HILL and FRAINE began, some time ago, a comparative study of the transition region in seedlings. Their preliminary announcement of results was noted in this journal;[10] the first paper of the series has appeared recently.[11]

The species examined in this part of the work are included in thirteen genera of the Coniferales. Two subfamilies of the Taxaceae are represented, the Podocarpineae and the Taxineae; and of the Pinaceae two subfamilies, the Taxodineae and the Cupressineae. In all the conifer seedlings examined the authors find the transition to be according to VAN TIEGHEM'S type 3 or a modification of it. In all but Podocarpus, which has two, there is only one vascular bundle in each

[10] BOT. GAZETTE **43**:77. 1907.

[11] HILL, T. G., AND FRAINE, E. DE, The seedling structure of gymnosperms. I. Annals of Botany **22**:689–712. 1908.

cotyledon. The cotyledonary bundles contain either centripetal xylem or its lineal descendant, transfusion tissue, the pronounced mesarch bundle occurring in greater proportion in the Taxineae (Taxus and Cephalotaxus). With respect to the number of cotyledons, only members of the Pinaceae (Cryptomeria and *Sequoia gigantea* in the Taxodineae, and Libocedrus and some species of Cupressus among the Cupressineae) have more than two. The presence of resin ducts, likewise, was observed only in the Pinaceae, Juniperus having them in the leaves, and the Taxodineae having them in the cotyledons in all the forms examined, except Widdringtonia. Two instances of fusion of cotyledons are reported: in *Widdringtonia Whytei*, the two cotyledons unite laterally to form one, recalling the leaf of Sciadopitys; in *Cupressus torulosa*, the cotyledons fuse near the base to form a tube. In every case the number of root poles corresponds with the number of "whole" cotyledons.

The authors believe that dicotyledony is the more primitive condition, and that the polycotyledonous form has been derived from it by splitting; but the statement of their reasons for this conclusion is deferred to a future paper.

It is a hopeful sign that the authors did not intrust this valuable collection of seedlings to the mercy of a razor; to read that the sections were made in an orderly fashion with the help of a microtome gives double assurance that the observations are accurate.—HELEN A. DORETY.

Root excretions.—STOKLASA and ERNST[12] report a conclusive piece of work on root excretions. The excellent technique these workers have developed in handling similar problems makes their contribution in this much disputed field unusually valuable. They find that no acid (organic or inorganic) except H_2CO_3 is excreted by roots, if they are fully supplied with oxygen, so that aerobic respiration is unrestrained. In limited oxygen supply, certain organic acids are formed and excreted; but in no case is any inorganic acid or salt excreted; not even monopotassium phosphate, contrary to the claim of CZAPEK. The organic acids appearing under limited oxygen supply vary with the plant used. Buckwheat and barley give formic and acetic acids; oats and maize, formic; and the beet, oxalic. STOKLASA and ERNST believe these acids arise from the incompletely oxidized products of respiration. In a full oxygen supply they maintain that these acids are oxidized to carbon dioxid and water.

The authors are to make an exhaustive investigation of the question whether any hydrogen is produced in the aerobic respiration of roots, and what organic acids are excreted by the roots of many other species of plants under limited oxygen supply.

The authors also determined the amount of CO_2 excreted by the root systems of barley, oats, rye, and wheat. The barley root-system gives off the greatest amount of CO_2 and produces the greatest dry weight. The quotient arising from

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[12] STOKLASA, J., AND ERNST, A., Beiträge zür Lösung der Frage der chemischen Natur des Wurzelsekretes. Jahrb. Wiss. Bot. **46**:55–102. 1908.